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IS 15891-4 (2011): Textiles - Test Methods for Nonwovens, Part 4: Determination of Tear Resistance [TXD 30: Geotextiles and Industrial Fabrics]

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वस्त्रादि — बिना बुने हुए वस्त्रों की परीक्षण विधियाँ

भाग 4 विदारण प्रतिरोध ज्ञात करना

Indian Standard

TEXTILES — TEST METHODS FOR NONWOVENS

PART 4 DETERMINATION OF TEAR RESISTANCE

ICS 59.080.01

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

June 2011 **Price Group 2**

Geosynthetics Sectional Committee, TXD 30

NATIONAL FOREWORD

This Indian Standard (Part 4) which is identical with ISO 9073-4 : 1997 'Textiles — Test methods for nonwovens — Part 4: Determination of tear resistance' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Geosynthetics Sectional Committee and approval of the Textile Division Council.

This standard has been published in various parts. The other parts in this series are:

Part 1	Determination of mass per unit area
Part 2	Determination of thickness
Part 3	Determination of tensile strength and elongation
Part 6	Absorption
Part 7	Determination of bending length
Part 8	Determination of liquid strike-through time (simulated urine)
Part 9	Determination of drape coefficient

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 139 : 1973 Textiles — Standard atmospheres for conditioning and testing	IS 6359 : 1971 Method for conditioning of textiles	Technically Equivalent
ISO 186 : 1985 Paper and board — Sampling to determine average quality	IS 2500 (Part 1) : 2000 Sampling procedure for inspection by attributes: Part 1 Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection (*third revision*)	do

The conditioning temperature of 20±2°C as specified in International Standards is not suitable for tropical countries like India where the atmospheric temperature is normally much higher than 20°C. It is almost impossible to maintain this temperature specially during summer when the atmospheric temperature rises even up to 50°C. In view of the above, IS 6359 :1971 'Method for conditioning of textiles' which specifies a temperature of 27±2°C for conditioning of the test specimens for the tropical countries like India shall be referred.

(*Continued on third cover*)

Indian Standard

TEXTILES — TEST METHODS FOR NONWOVENS

PART 4 DETERMINATION OF TEAR RESISTANCE

1 Scope

This part of ISO 9073 specifies a method for the determination of tear resistance of nonwovens by the trapezoid method.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9073. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9073 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 139:1973, *Textiles — Standard atmospheres for conditioning and testing.*

ISO 186:1994, *Paper and board — Sampling to determine average quality.*

3 Principle

Marking of a trapezoid on a test piece.

Clamping of the non-parallel sides of the trapezoid in the jaws of a tensile testing machine.

Application of a continuously increasing extension to the test piece in such a way that a tear propagates across its width.

Determination of the average maximum tear resistance in newtons.

4 Apparatus

4.1 Tensile testing machine, either constant rate of extension type or constant rate of traverse type, equipped with an autographic recorder to register applied force.

4.2 Clamps, of sufficient width to accommodate the full width of the test piece.

4.3 Template, with dimensions as shown in figure 1.

Dimensions in millimetres

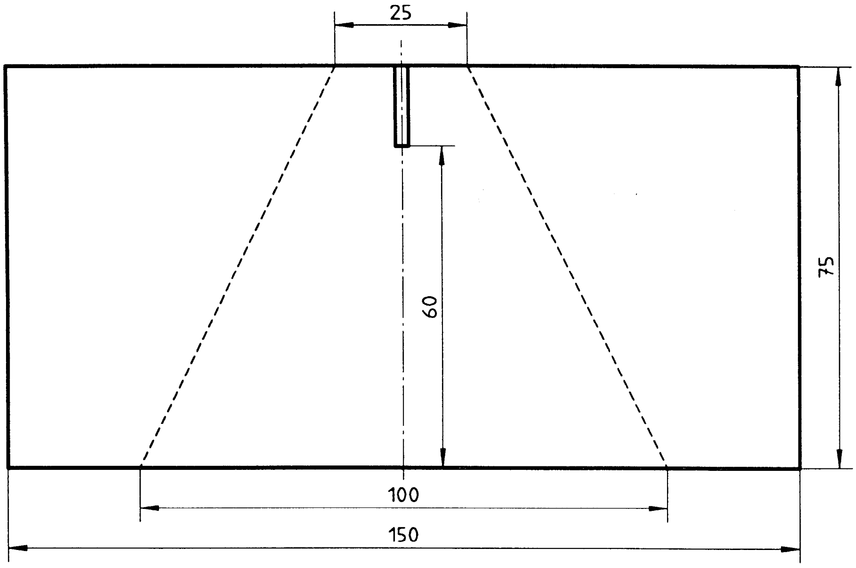

Figure 1 — Template for trapezoid tearing test

5 Sampling

Carry out sampling in accordance with ISO 186, ensuring that the areas from which the specimens are taken have no visible flaws and are not creased.

NOTE 1 This method of sampling recognizes and makes provisions for "anisotropy" (differences in properties along various directions, principally machine and cross direction) in the final specimens. However, these specimens are random representatives of the material and in some cases it may be desirable to investigate systematic variations of properties (including anisotropy), for example across the width, or in certain positions along the length of a given reel. In all such cases, special provisions should be agreed between purchaser and vendor and recorded in the test report. A procedure for more detailed examination of variability within a given batch of material is available in TAPPI T 11.05.74 and may be found helpful. This publication may be obtained from: The Technical Association of Pulp and Paper Industries, 1 Dunwoody Park, Atlanta, Georgia 30338, USA.

6 Preparation and conditioning of test pieces

6.1 Unless otherwise specified, cut five test pieces in the machine direction and five in the cross-machine direction.

NOTE 2 The edge of the specimen should not normally form part of the test piece.

6.2 Cut test pieces (75 ± 1) mm × (150 ± 2) mm. Mark each test piece with an isosceles trapezoid using the template. Make a preliminary cut as shown in figure 1.

NOTE 3 Other dimensions, respecting the general proportions of the original test piece, may be agreed between interested parties, especially in order to reproduce some in-use conditions of nonwovens, and should be noted in the test report. The values measured with different test piece dimensions cannot be compared.

6.3 Condition the test pieces as specified in ISO 139.

7 Procedure

7.1 Carry out the testing in the standard atmosphere for testing (see ISO 139).

7.2 At the start of the test, set the clamps (25 ± 1) mm apart and operate the machine at 100 mm/min. Select the force range of the testing machine so that the break occurs between 10 % and 90 % of full scale.

7.3 Secure the test piece in the machine, clamping along the non-parallel sides of the trapezoid with the cut half-way between the clamps. Hold the short edge taut and let the long edge lie in folds.

7.4 Start the machine with pawls disengaged, if appropriate, and record the tearing force, in newtons, on the autographic recorder. If the test piece does not tear at the cut, no result shall be registered.

NOTE 4 The tearing force will not usually be a single value but will generally appear as a series of maxima and minima.

8 Expression of results

Determine the average value of the series of significant load peaks (see note 5) represented on the autographic record for each individual test piece for both machine direction and cross direction. In the event that there is only one definite load peak on the autographic record, this value shall be taken as the result for that specimen.

Determine the mean and coefficient of variation of the results for the five test pieces in both the machine and cross directions.

NOTES

5 The displacement of the clamps is measured with the starting distance between the clamps at 25 mm.

The tear propagation resistance is recorded until the test piece breaks completely, but the results are only valid up to the displacement of the clamps reaching 64 mm. Beyond this value, the measured tear force is reduced by the proximity of the border of the test piece.

For this reason, the significant peak loads to be considered are those corresponding to the displacement of the clamps below the limit of 64 mm.

6 Where electronic recording machines are used, it is possible to obtain a mean force for each test piece, which is then averaged to give the final results.

For the same reason as expressed in note 5, the mean force should be calculated between the following two limits:

- the displacement of the clamps corresponding to the first load peak;
- the displacement of the clamps equal to 64 mm.

9 Test report

The test report shall include the following information:

a) a reference to this par of ISO 9073;

b) all details necessary for the identification of the material;

c) the results of the tests in both the machine direction and cross direction (see clause 8);

d) the conditioning atmosphere used;

e) any unusual features noted during the testing, or deviations from the standard procedure.

(*Continued from second cover*)

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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This Indian Standard has been developed from Doc No.: TXD 30 (0929).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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